IN THE DRAWINGS

Proposed changes to Figs. 2, 3, 5, 6, 8, 11, 14, 15, 17, 18, 20, 23, 26, 27, 31, 34, 35, 40, 41, 44, and 45 are submitted herewith, with a Letter to the Official Draftsman.

REMARKS

Reconsideration and allowance of this application are respectfully requested in light of the above amendments and the following remarks.

Proposed changes to Figs. 2, 3, 5, 6, 8, 11, 14, 15, 17, 18, 20, 23, 26, 27, 31, 34, 35, 40, 41, 44, and 45 are submitted herewith, along with Replacement Sheets, to overcome the objections thereto. The figures have been amended to contain directional flow arrows.

Claim 1 has been amended to highlight patentable aspects of the invention. Non-elected claims 3-17 have been canceled. Support for the subject matter of amended claim 1 is provided at least in paragraph [0092] of the specification on page 22, lines 8-15.

Claims 1 and 2 were rejected, under 35 USC §102(e) as being anticipated by Tanaka (US 6,505,334).

To the extent that these rejections may be deemed applicable to the amended claims, the Applicants respectfully traverse, based on the following points.

Claim 1 now recites checking the ratio between the layout of wires in a chip layout and the layout of contact holes in the wires so as to detect wire formation defects in a semiconductor device.

In an exemplary but non-limiting embodiment of the invention, the ratio may be defined by the area of the contact holes in the wires to the area of the layout of the wires. In another exemplary but non-limiting embodiment, the ratio may be defined by the number of contact holes in the wires to the number of wires.

By contrast to the claimed subject matter, Tanaka discloses monitoring the wiring density of an integrated circuit layer and employing contact holes to route layout wiring to a different layer of the integrated circuit so as to prevent the wiring density of the monitored layer from exceeding an upper limit value (see Tanaka abstract and col. 2, lines 31-36). Tanaka does not disclose the claimed feature of checking the ratio between the layout of wires in a chip layout and the layout of contact holes in the wires so as to detect wire formation defects in a semiconductor device.

Accordingly, the Applicants submit that Tanaka does not anticipate the subject matter defined by claim 1. Therefore, allowance of claim 1 and dependent claim 2 is warranted.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

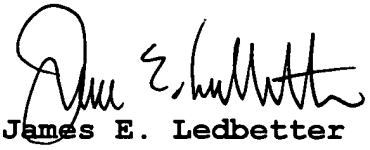

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FIG. 2

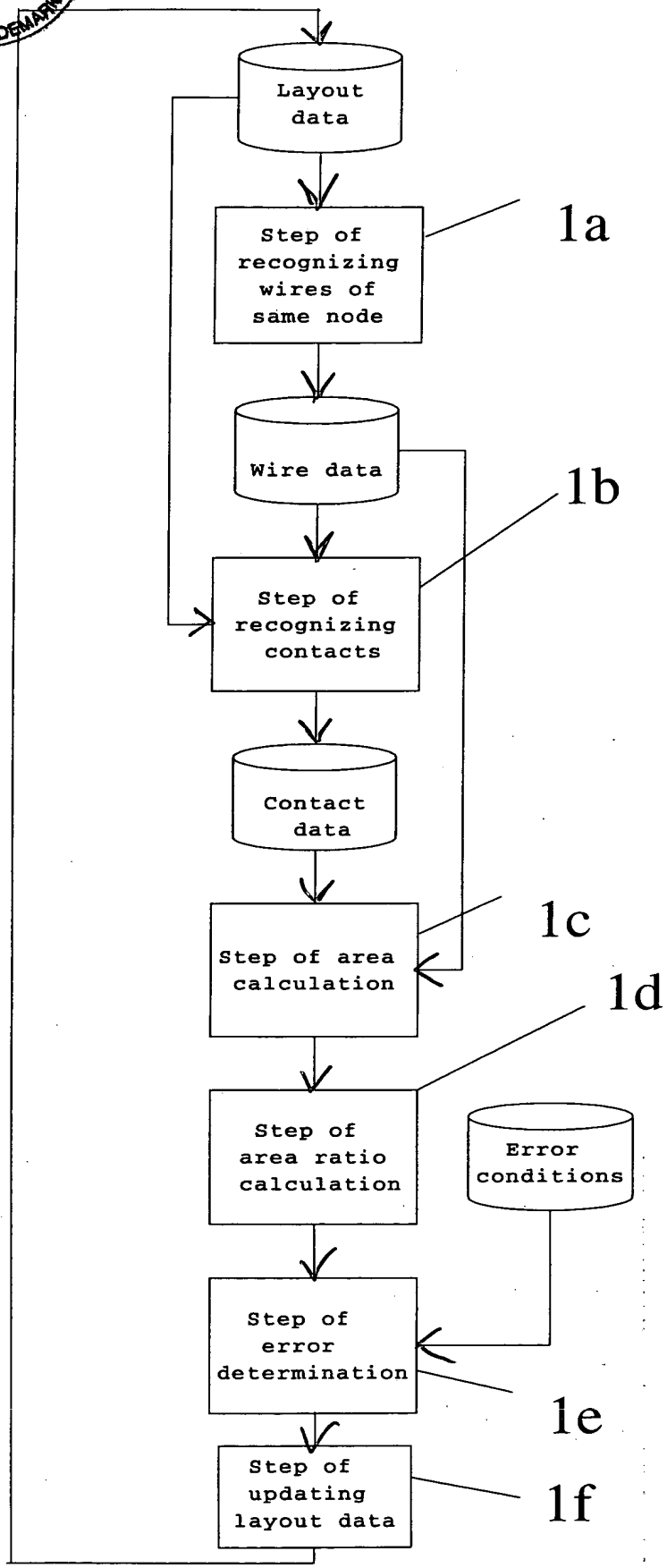


FIG. 3

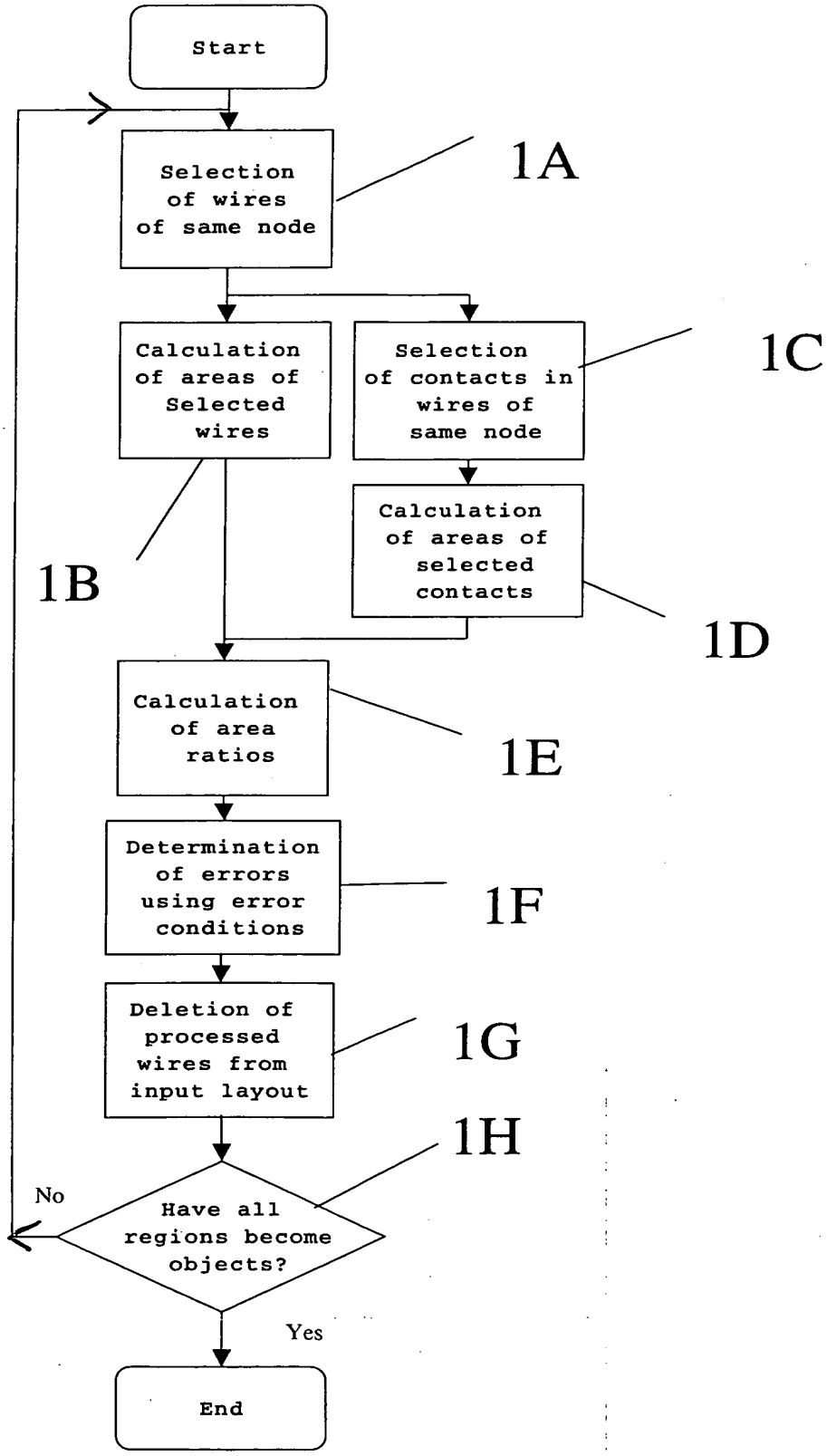

Start
Selection of wires of same node
1A
Calculation of areas of Selected wires
Selection of contacts in wires of same node
1C
1B
Calculation of areas of selected contacts
1D
Calculation of area ratios
1E
Determination of errors using error conditions
1F
Deletion of processed wires from input layout
1G
1H
No
Have all regions become objects?
Yes
End

FIG. 5

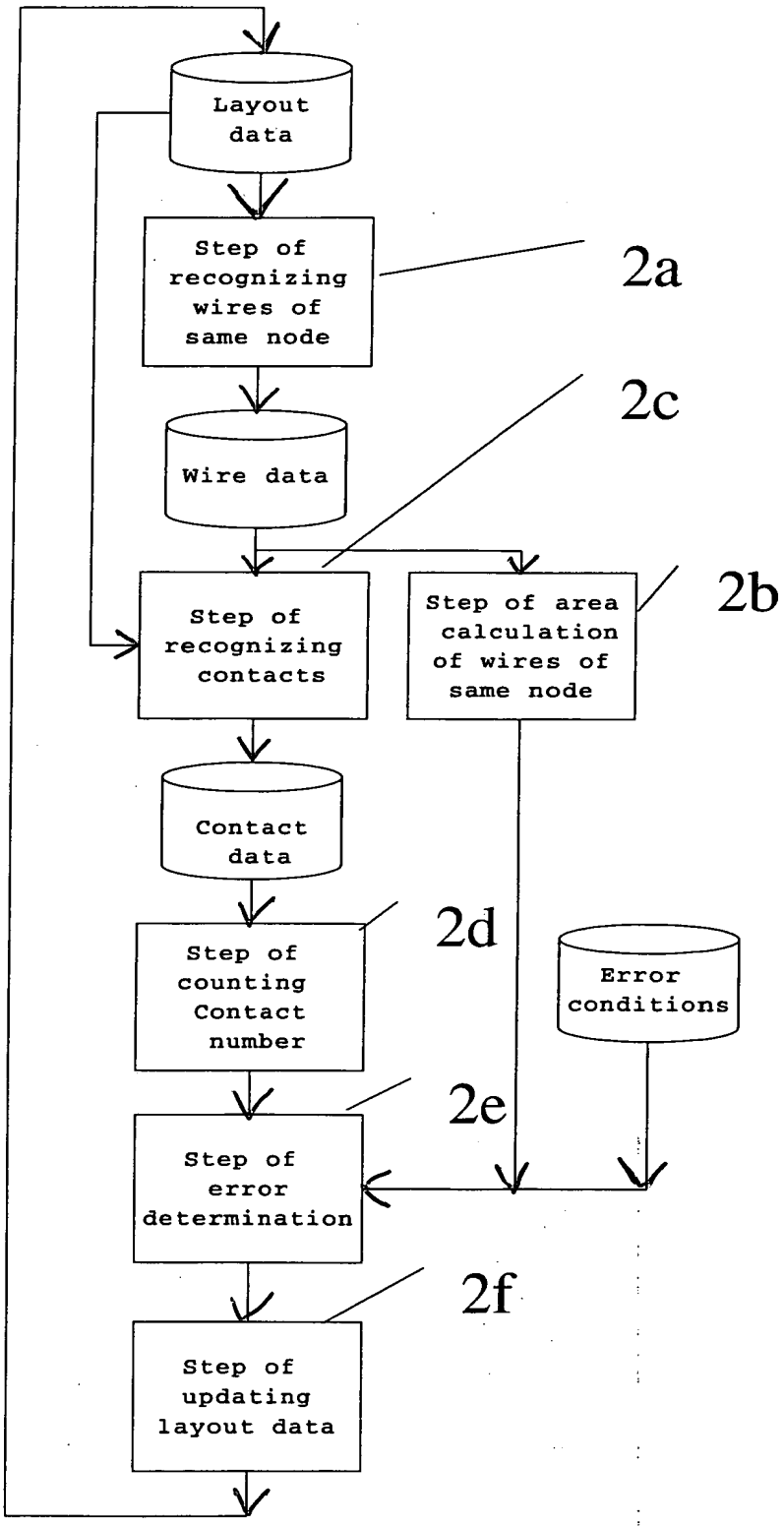

Layout data
Step of recognizing wires of same node
2a
Wire data
2c
Step of recognizing contacts
Step of area calculation of wires of same node
2b
Contact data
2d
Step of counting Contact number
Error conditions
2e
Step of error determination
2f
Step of updating layout data

FIG. 6

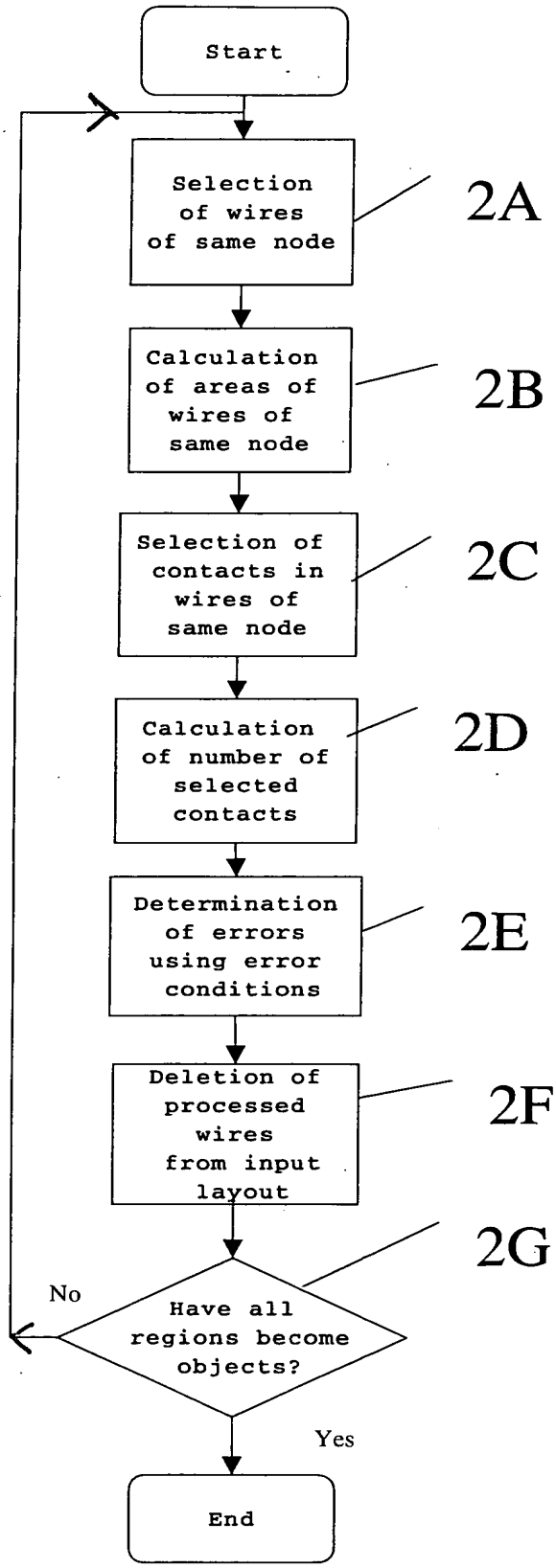

Start
Selection of wires of same node
2A
Calculation of areas of wires of same node
2B
Selection of contacts in wires of same node
2C
Calculation of number of selected contacts
2D
Determination of errors using error conditions
2E
Deletion of processed wires from input layout
2F
2G
Have all regions become objects?
No
Yes
End

FIG. 8

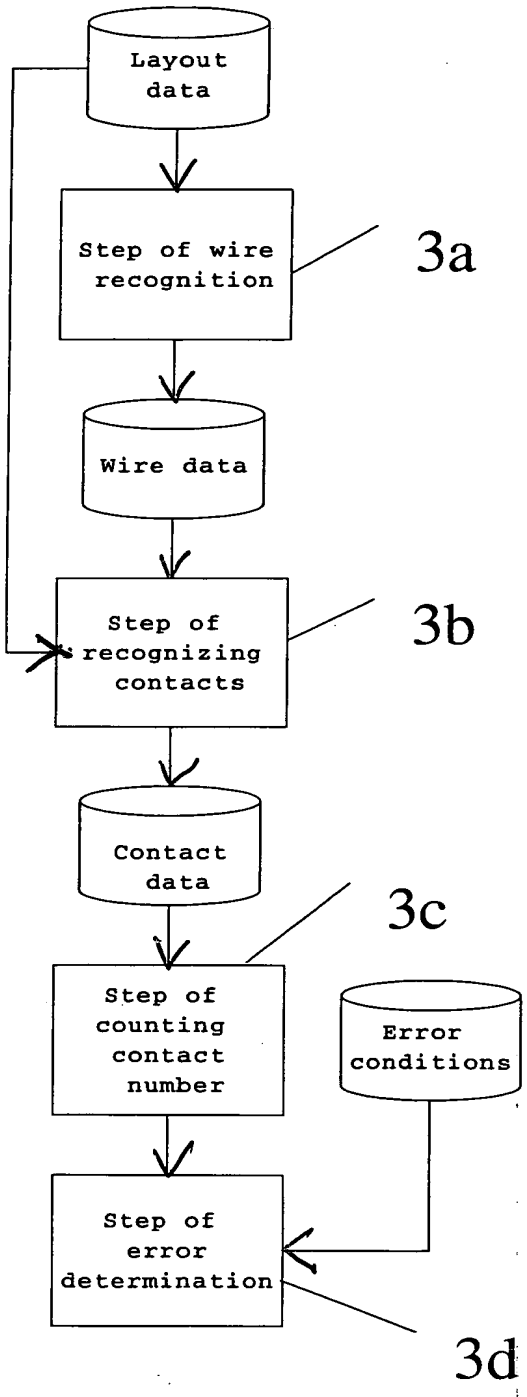

Layout data
Step of wire recognition
3a
Wire data
Step of recognizing contacts
3b
Contact data
3c
Step of counting contact number
Error conditions
Step of error determination
3d

FIG. 11

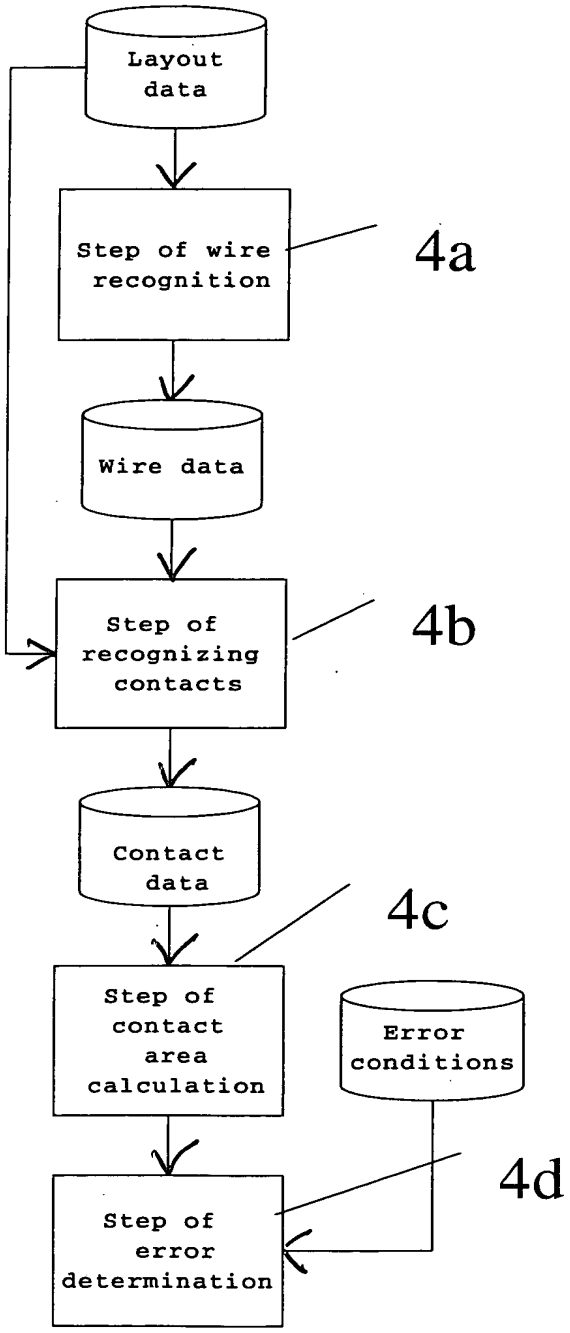

Layout data
Step of wire recognition
4a
Wire data
Step of recognizing contacts
4b
Contact data
4c
Step of contact area calculation
Error conditions
4d
Step of error determination

FIG. 14

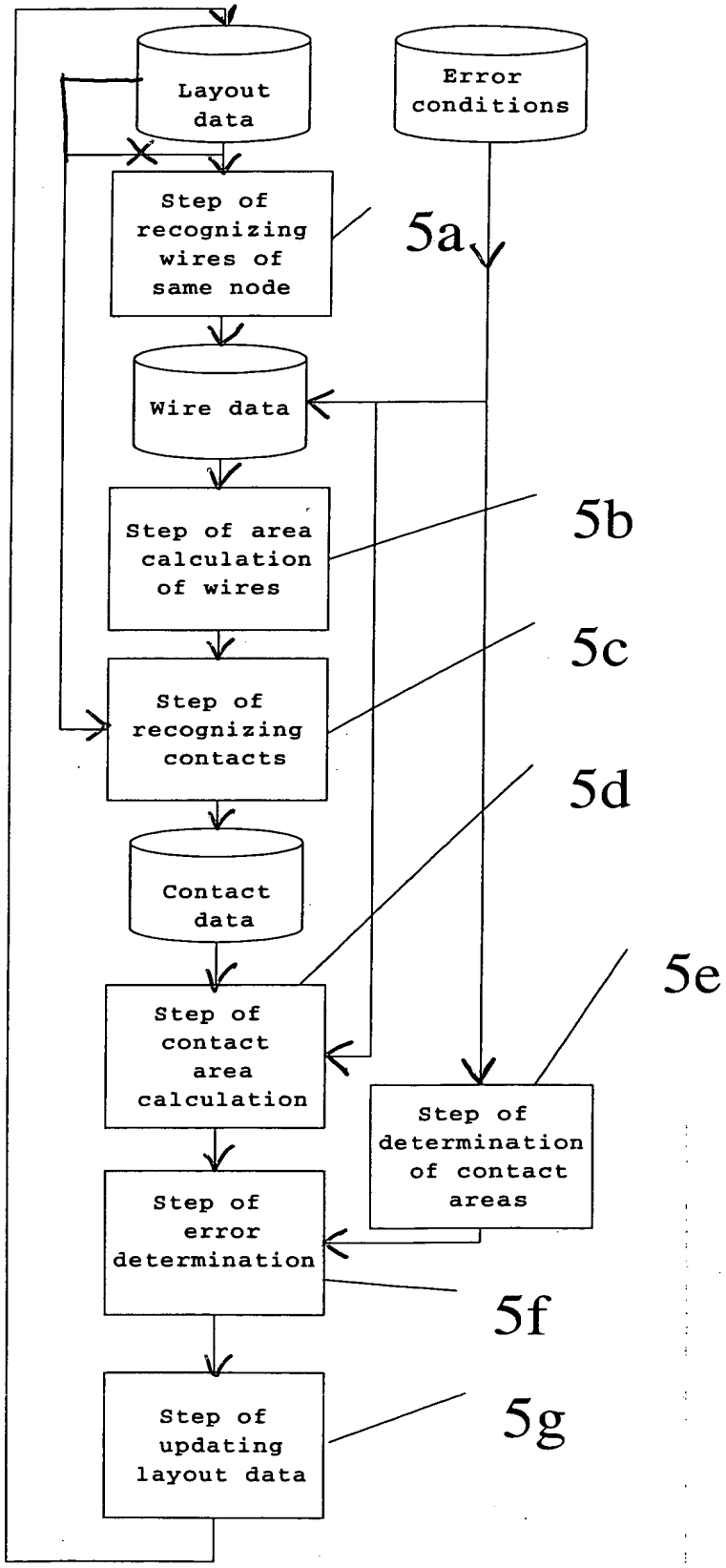

Layout data
Error conditions
Step of recognizing wires of same node
5a
Wire data
Step of area calculation of wires
5b
Step of recognizing contacts
5c
5d
Contact data
5e
Step of contact area calculation
Step of determination of contact areas
Step of error determination
5f
Step of updating layout data
5g

FIG. 15

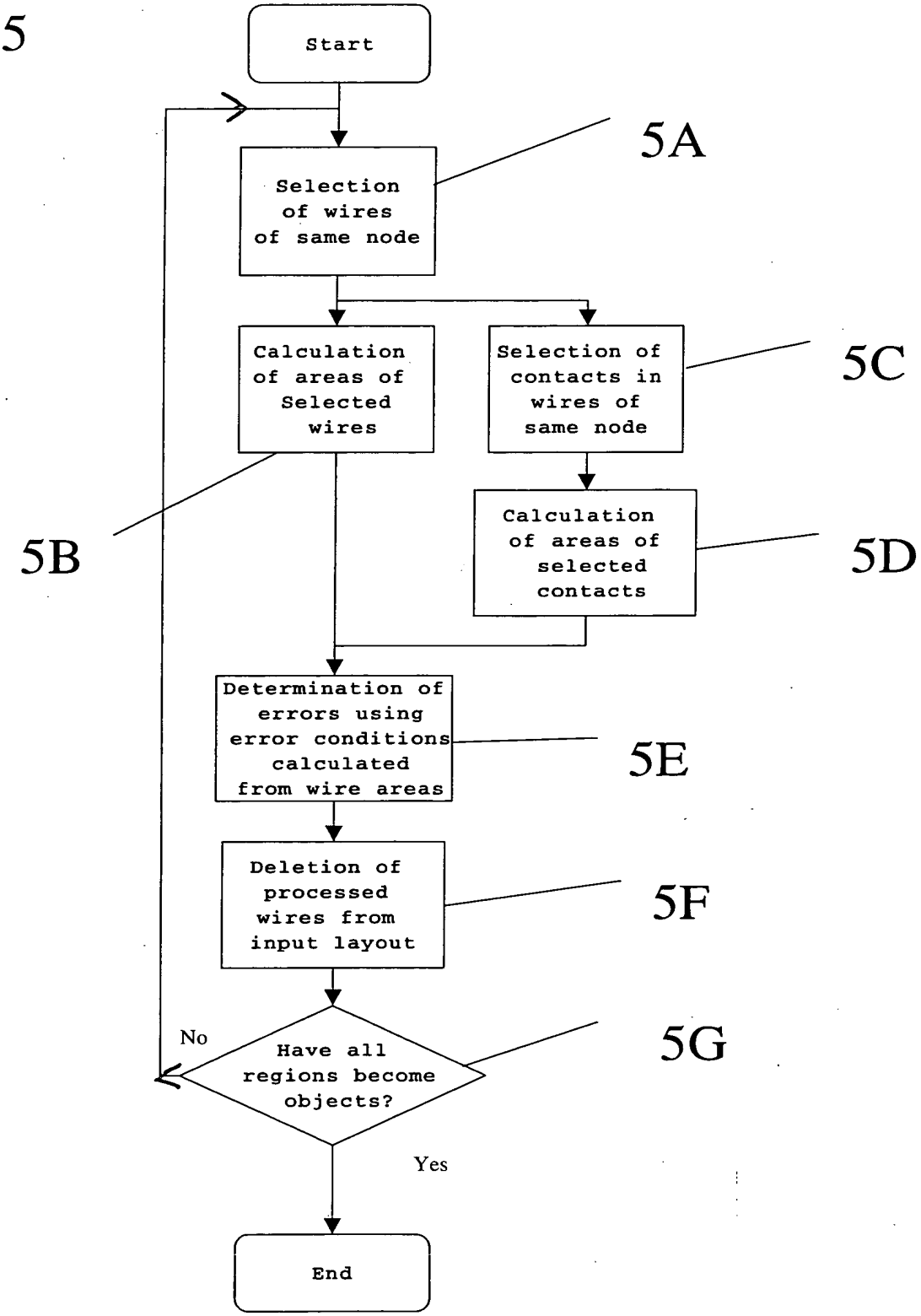

Start
Selection of wires of same node
5A
Calculation of areas of Selected wires
Selection of contacts in wires of same node
5C
5B
Calculation of areas of selected contacts
5D
Determination of errors using error conditions calculated from wire areas
5E
Deletion of processed wires from input layout
5F
No
Have all regions become objects?
5G
Yes
End

FIG. 17

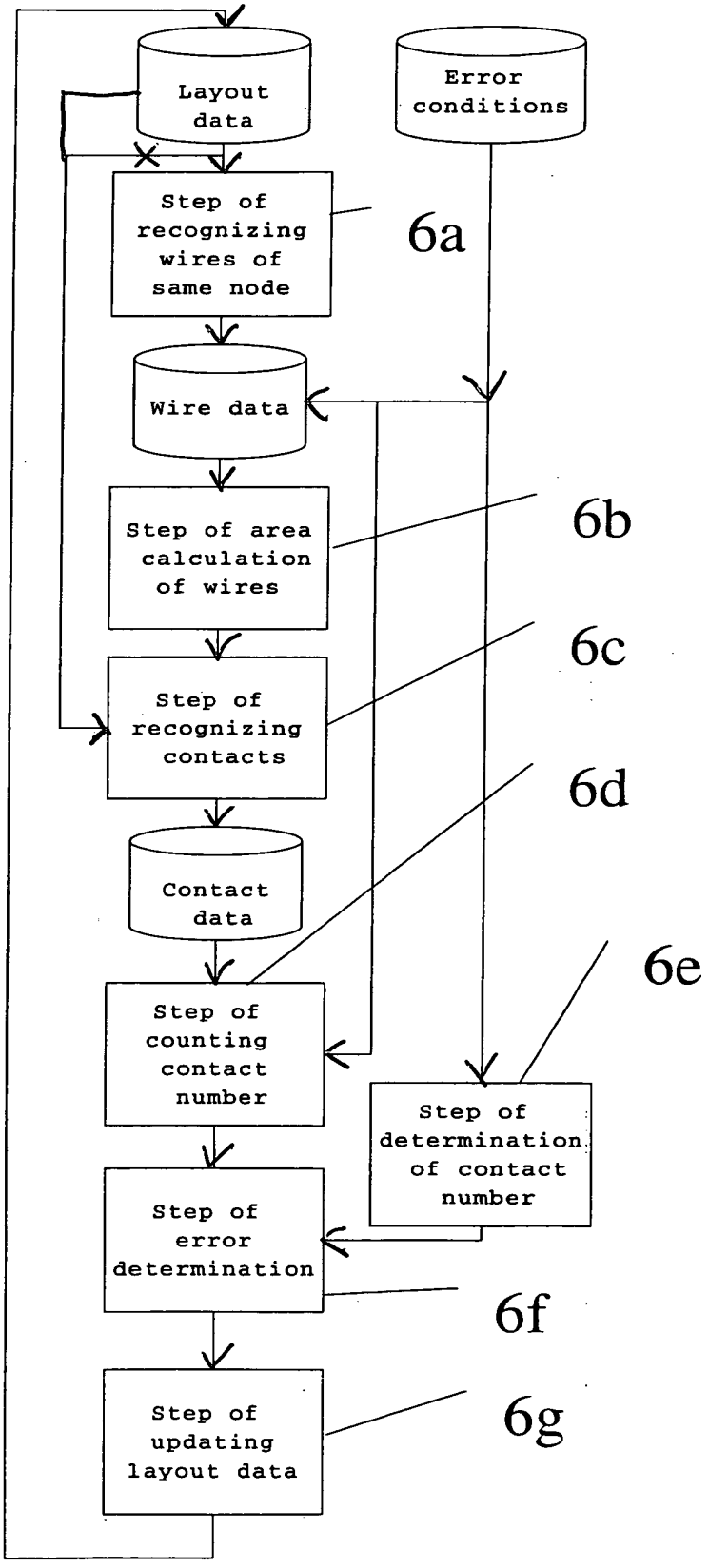

Layout data
Error conditions
Step of recognizing wires of same node
6a
Wire data
Step of area calculation of wires
6b
Step of recognizing contacts
6c
6d
Contact data
6e
Step of counting contact number
Step of determination of contact number
Step of error determination
6f
Step of updating layout data
6g

FIG. 18

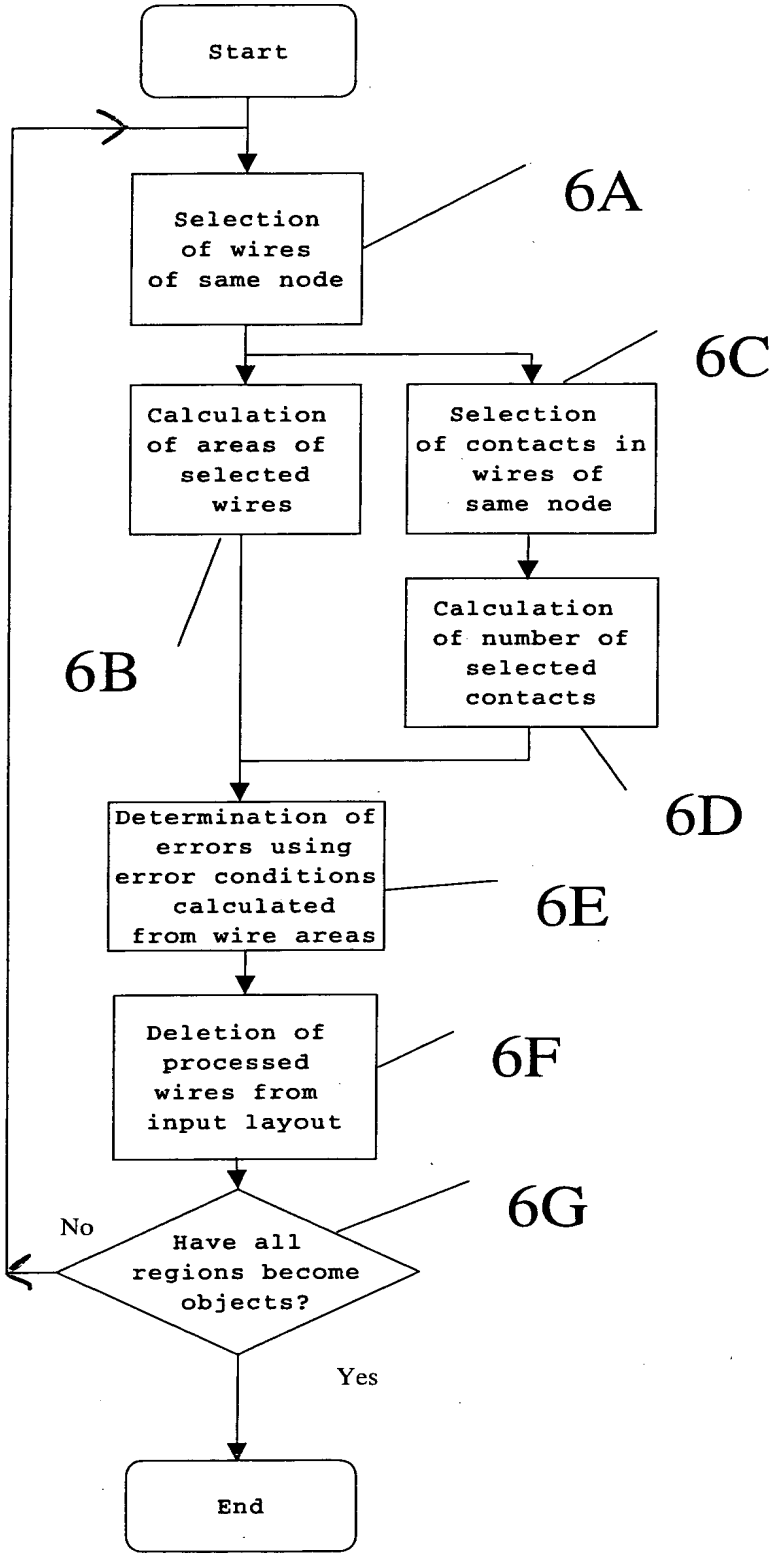

Start
Selection of wires of same node
6A
Calculation of areas of selected wires
6B
Selection of contacts in wires of same node
6C
Calculation of number of selected contacts
6D
Determination of errors using error conditions calculated from wire areas
6E
Deletion of processed wires from input layout
6F
Have all regions become objects?
6G
No
Yes
End

FIG. 20

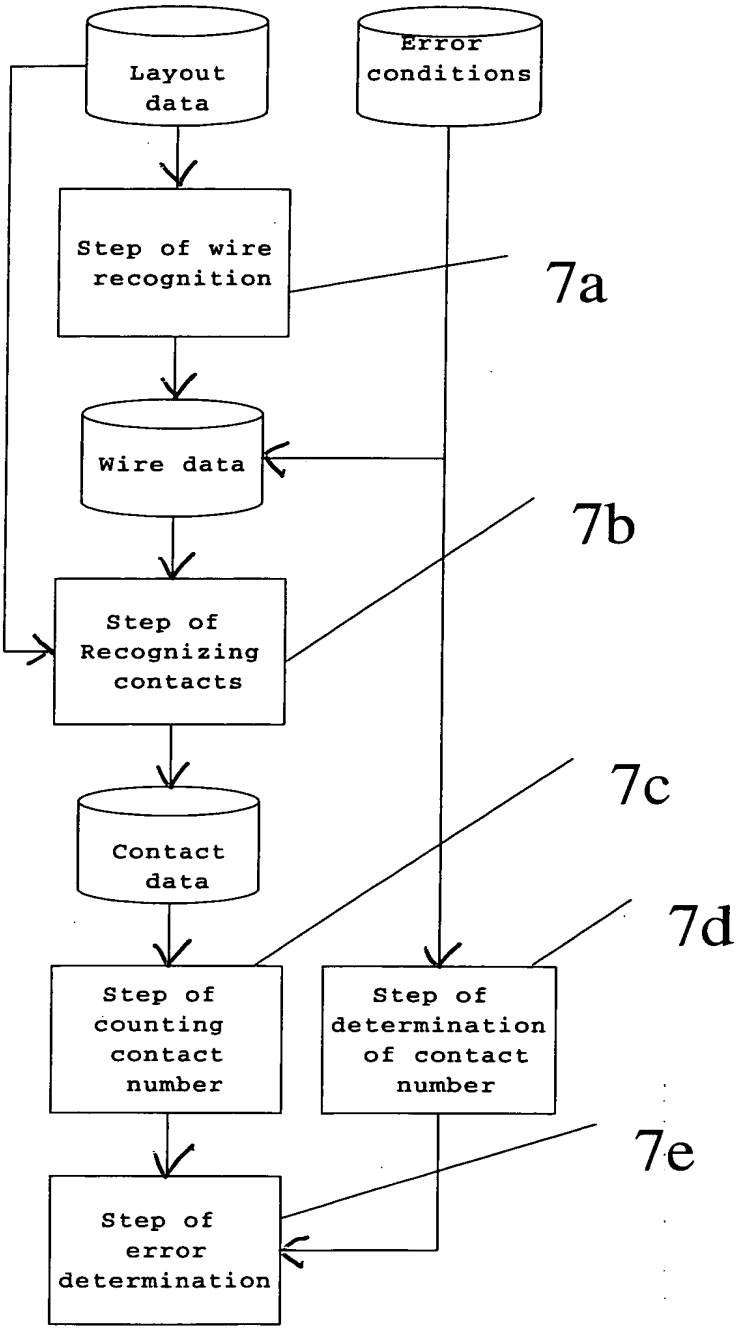

Layout data
Error conditions
Step of wire recognition
7a
Wire data
7b
Step of Recognizing contacts
7c
Contact data
7d
Step of counting contact number
Step of determination of contact number
7e
Step of error determination

FIG. 23

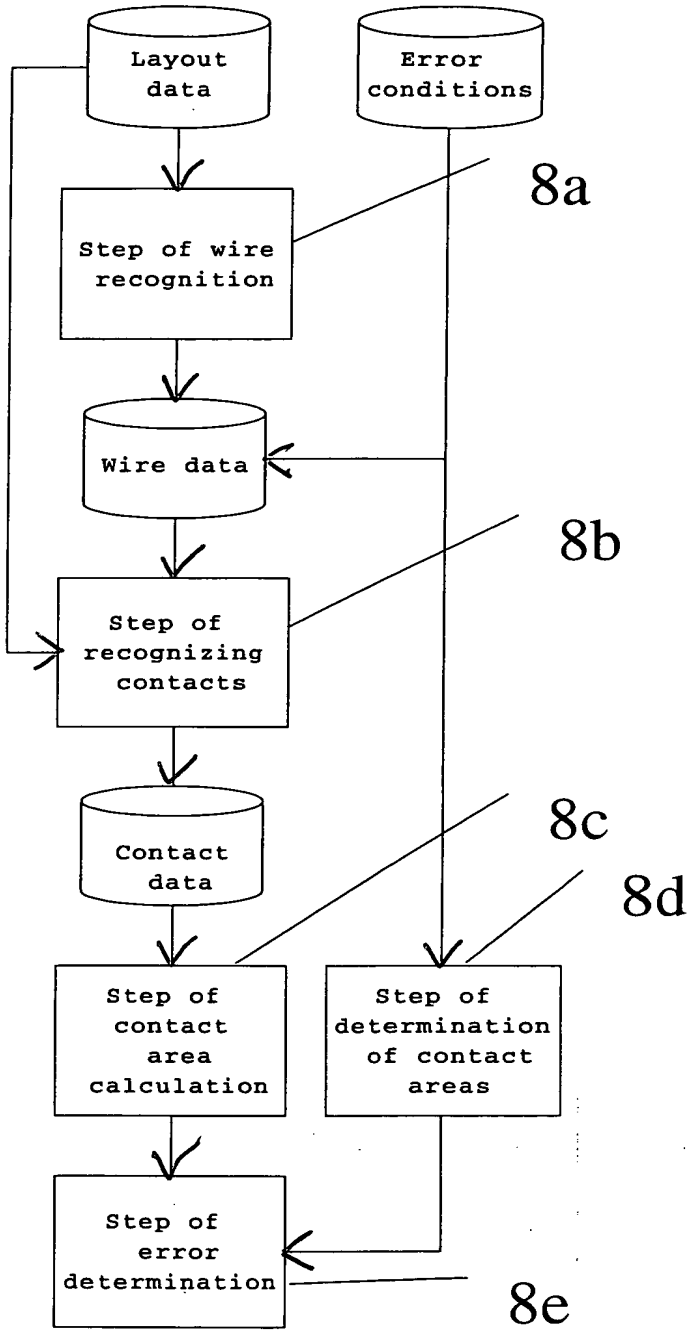

Layout data
Error conditions
8a
Step of wire recognition
Wire data
8b
Step of recognizing contacts
Contact data
8c
8d
Step of contact area calculation
Step of determination of contact areas
Step of error determination
8e

FIG. 26

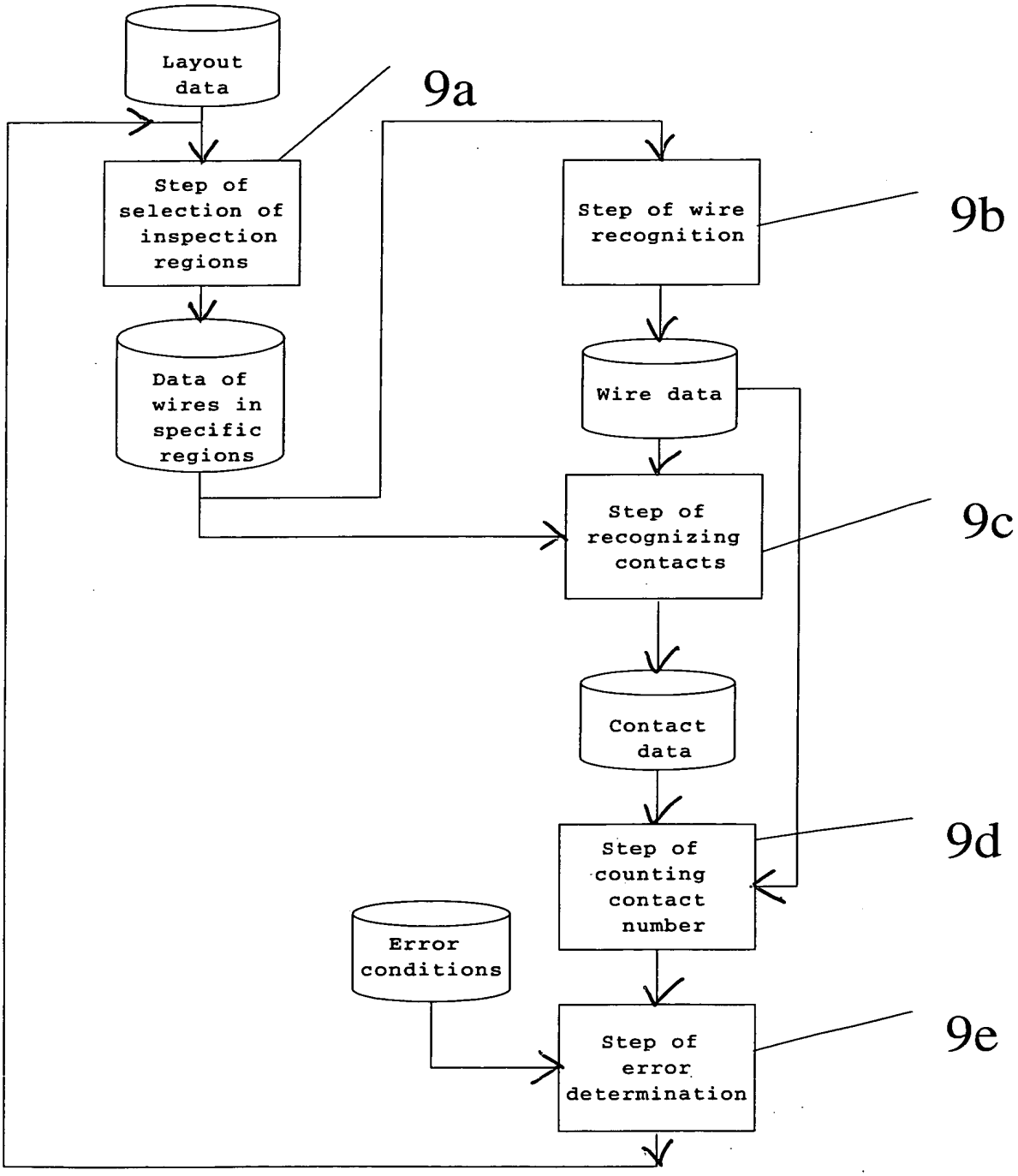

Layout data
9a
Step of selection of inspection regions
Step of wire recognition
9b
Data of wires in specific regions
Wire data
Step of recognizing contacts
9c
Contact data
Step of counting contact number
9d
Error conditions
Step of error determination
9e

FIG. 27

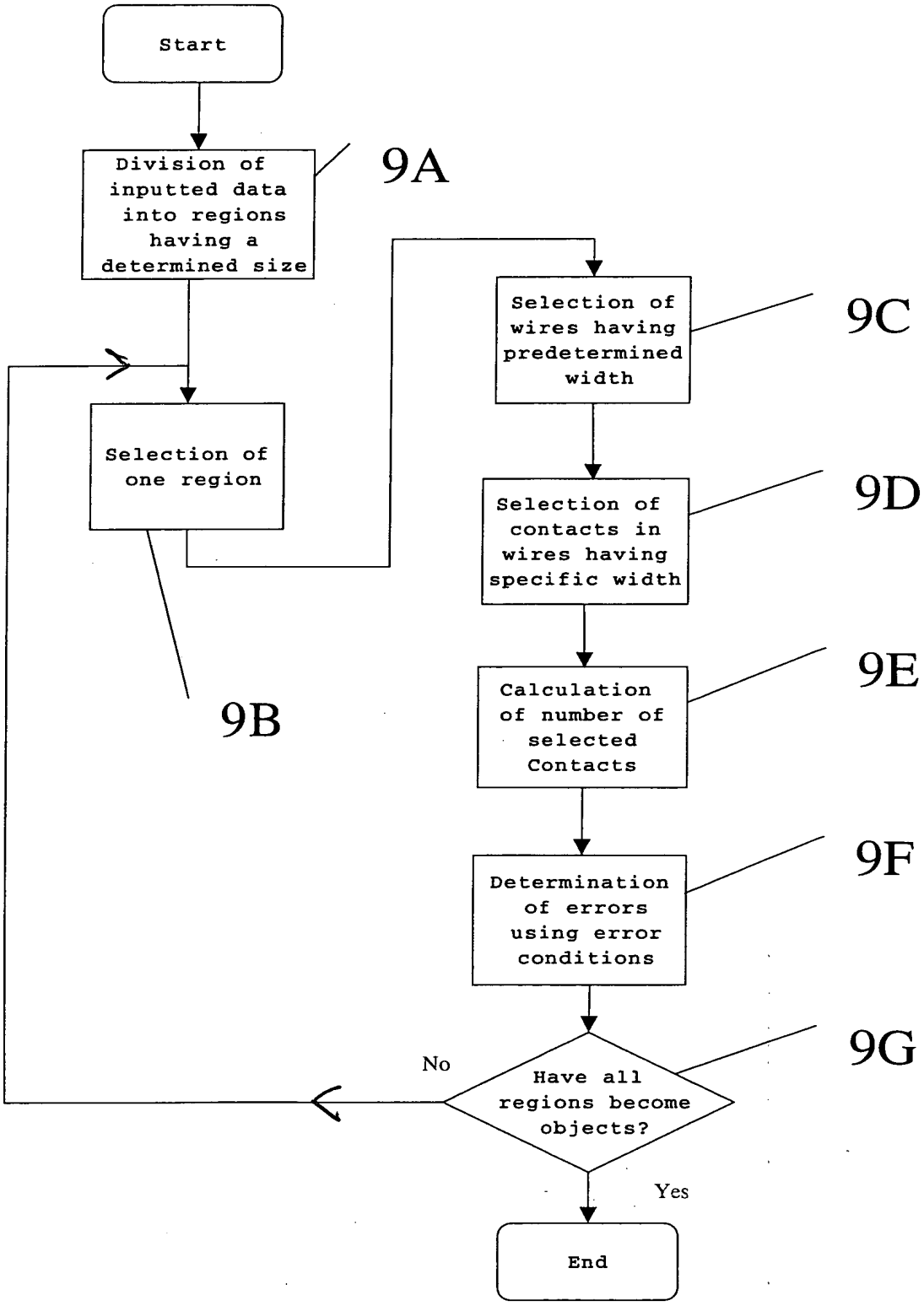

Start
Division of inputted data into regions having a determined size
9A
Selection of one region
9B
Selection of wires having predetermined width
9C
Selection of contacts in wires having specific width
9D
Calculation of number of selected Contacts
9E
Determination of errors using error conditions
9F
Have all regions become objects?
9G
No
Yes
End

FIG. 31

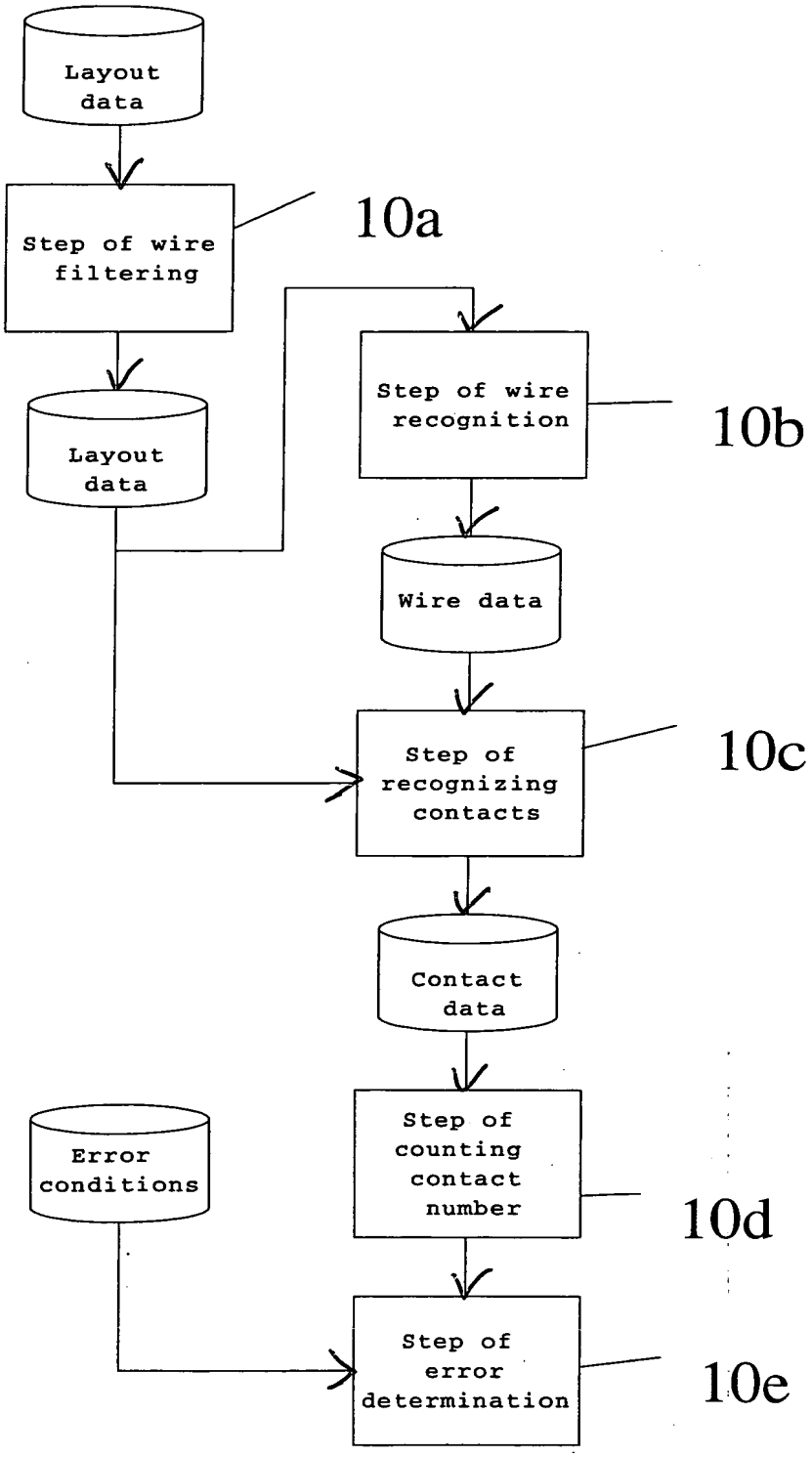

Layout data
Step of wire filtering
10a
Layout data
Step of wire recognition
10b
Wire data
Step of recognizing contacts
10c
Contact data
Error conditions
Step of counting contact number
10d
Step of error determination
10e

FIG. 34

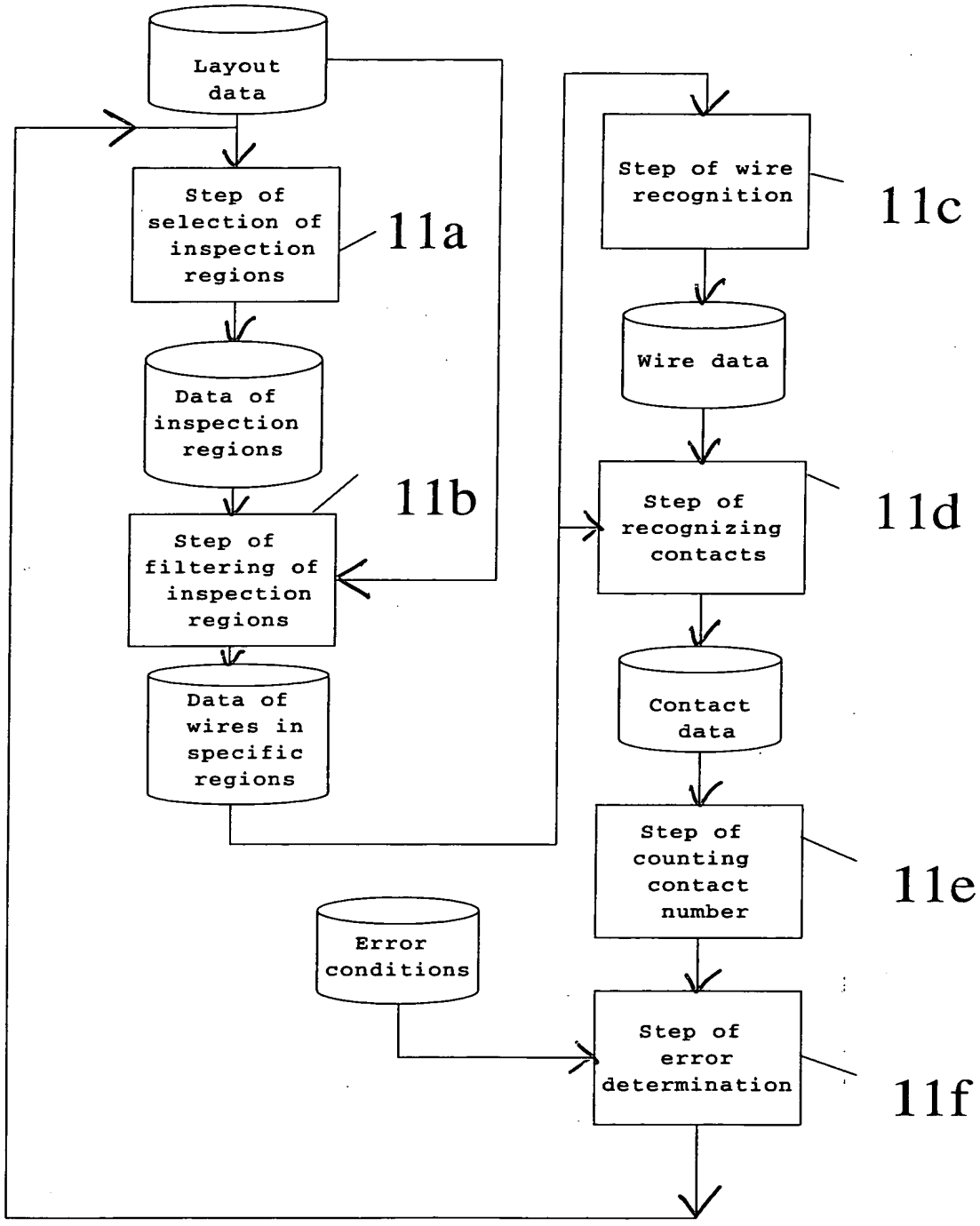

Layout data
Step of selection of inspection regions
11a
Data of inspection regions
11b
Step of filtering of inspection regions
Data of wires in specific regions
Step of wire recognition
11c
Wire data
Step of recognizing contacts
11d
Contact data
Step of counting contact number
11e
Error conditions
Step of error determination
11f

FIG. 35

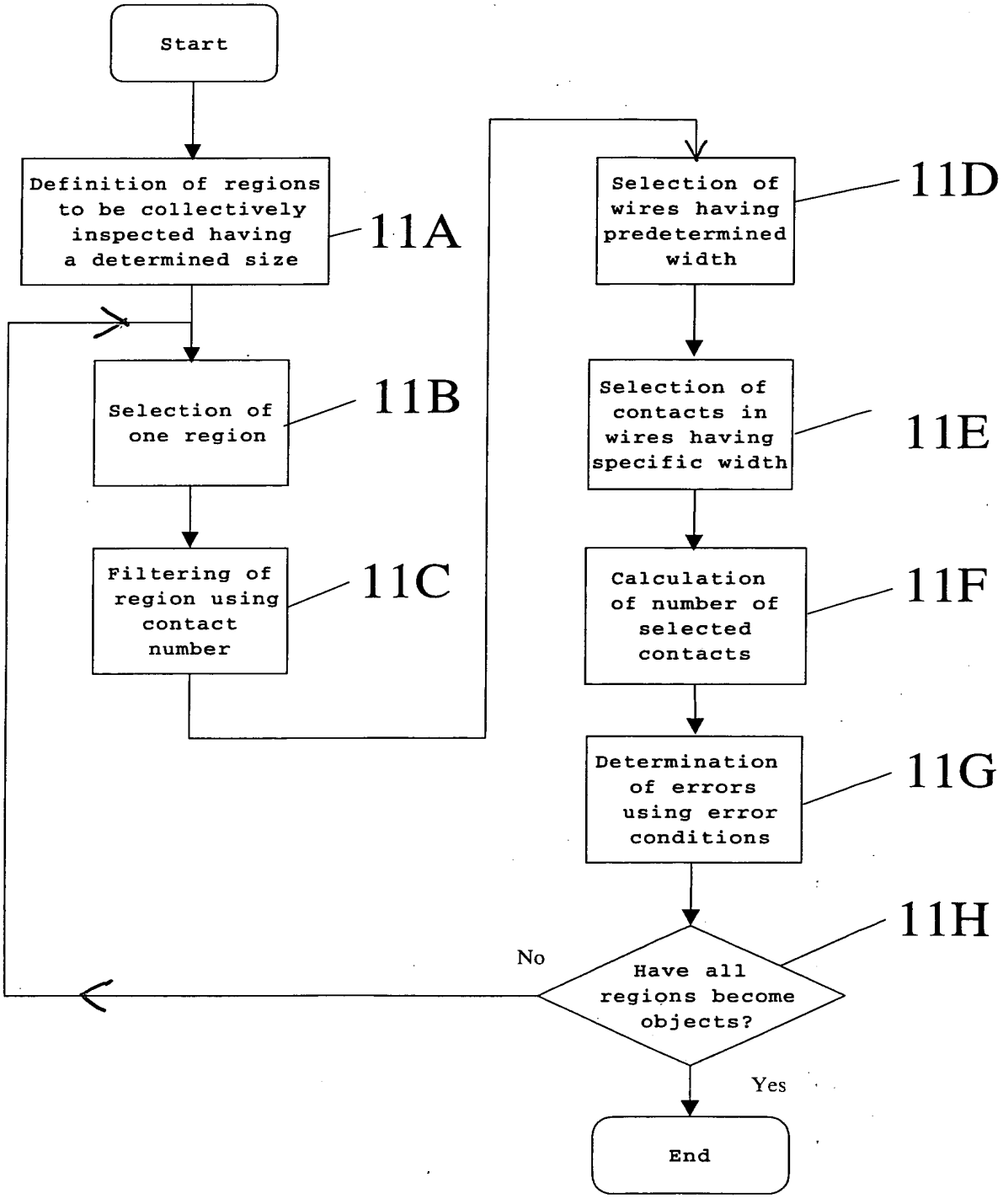

Start
Definition of regions to be collectively inspected having a determined size
11A
Selection of one region
11B
Filtering of region using contact number
11C
Selection of wires having predetermined width
11D
Selection of contacts in wires having specific width
11E
Calculation of number of selected contacts
11F
Determination of errors using error conditions
11G
Have all regions become objects?
11H
No
Yes
End

FIG. 40

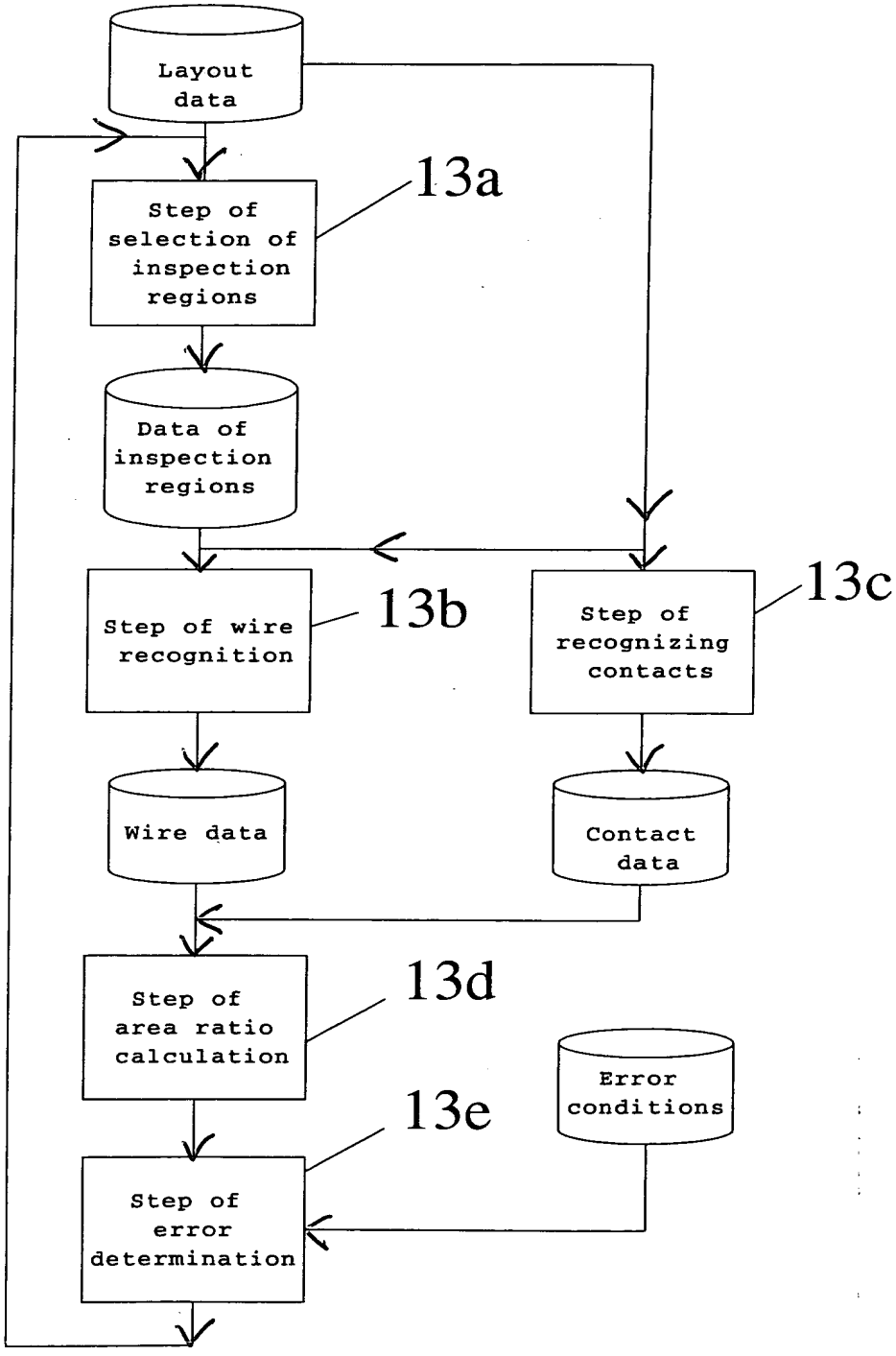

Layout data
Step of selection of inspection regions
13a
Data of inspection regions
Step of wire recognition
13b
Step of recognizing contacts
13c
Wire data
Contact data
Step of area ratio calculation
13d
Error conditions
13e
Step of error determination

FIG. 41

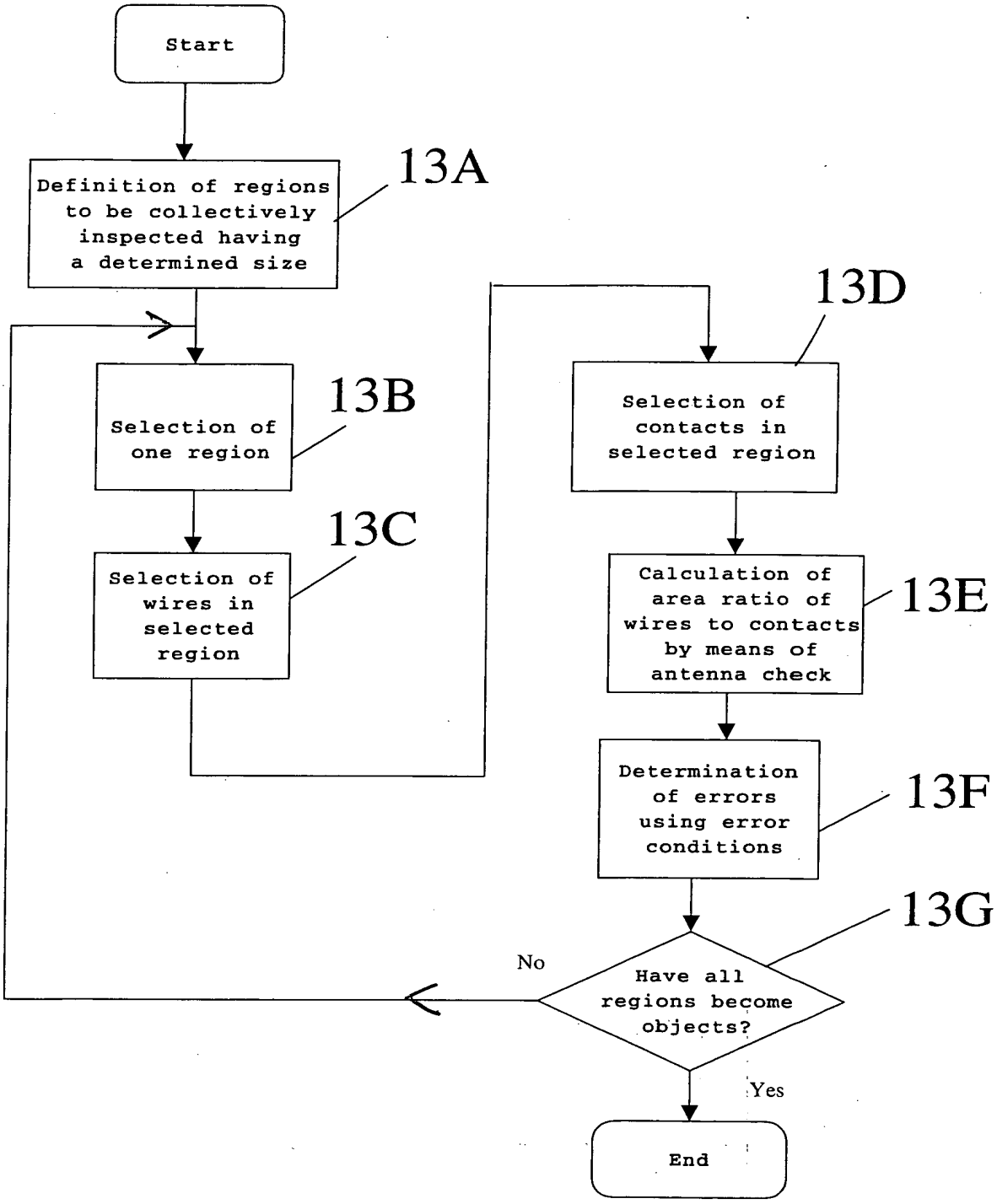

Start
Definition of regions to be collectively inspected having a determined size
13A
Selection of one region
13B
Selection of wires in selected region
13C
Selection of contacts in selected region
13D
Calculation of area ratio of wires to contacts by means of antenna check
13E
Determination of errors using error conditions
13F
Have all regions become objects?
13G
No
Yes
End

FIG. 44

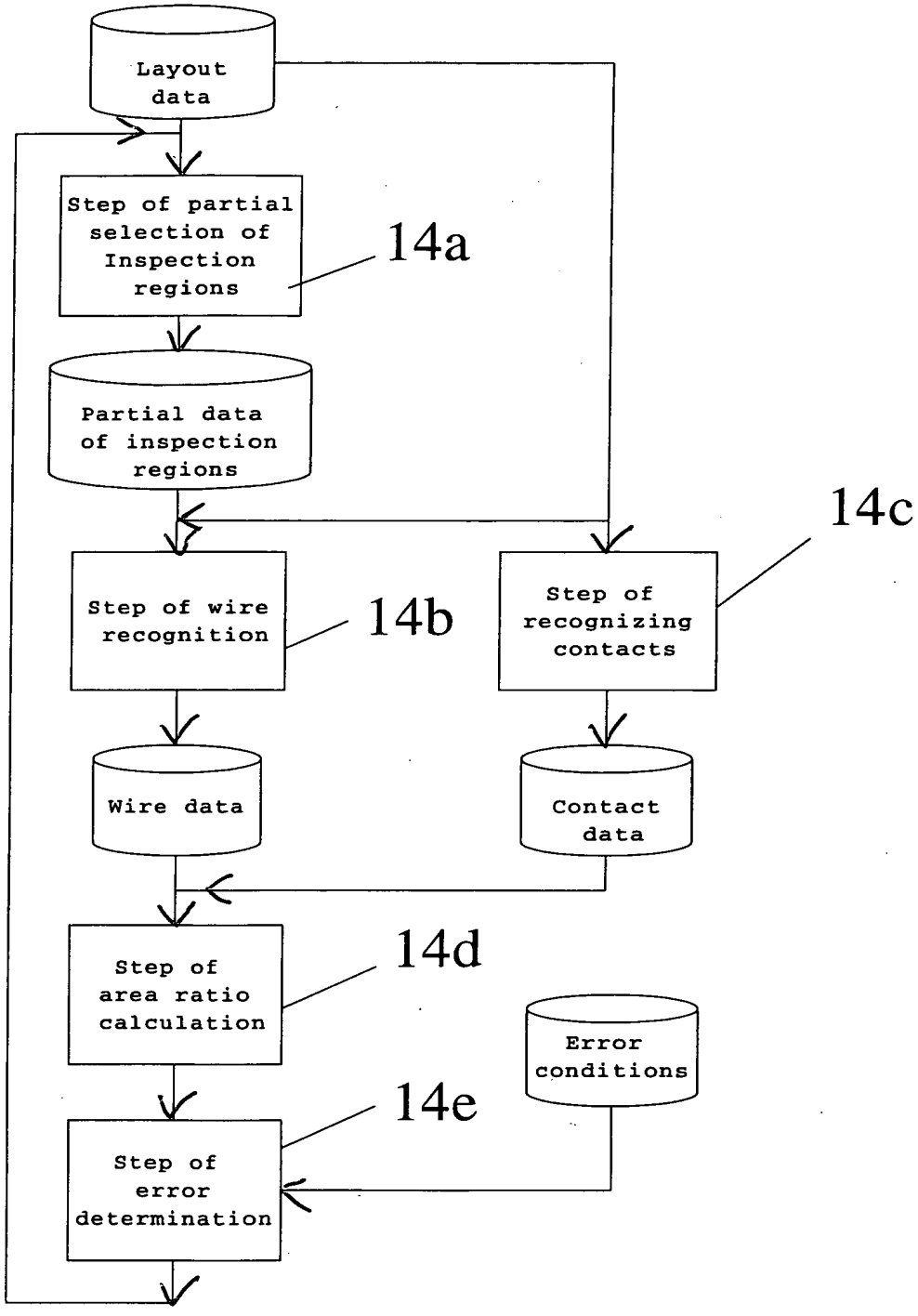
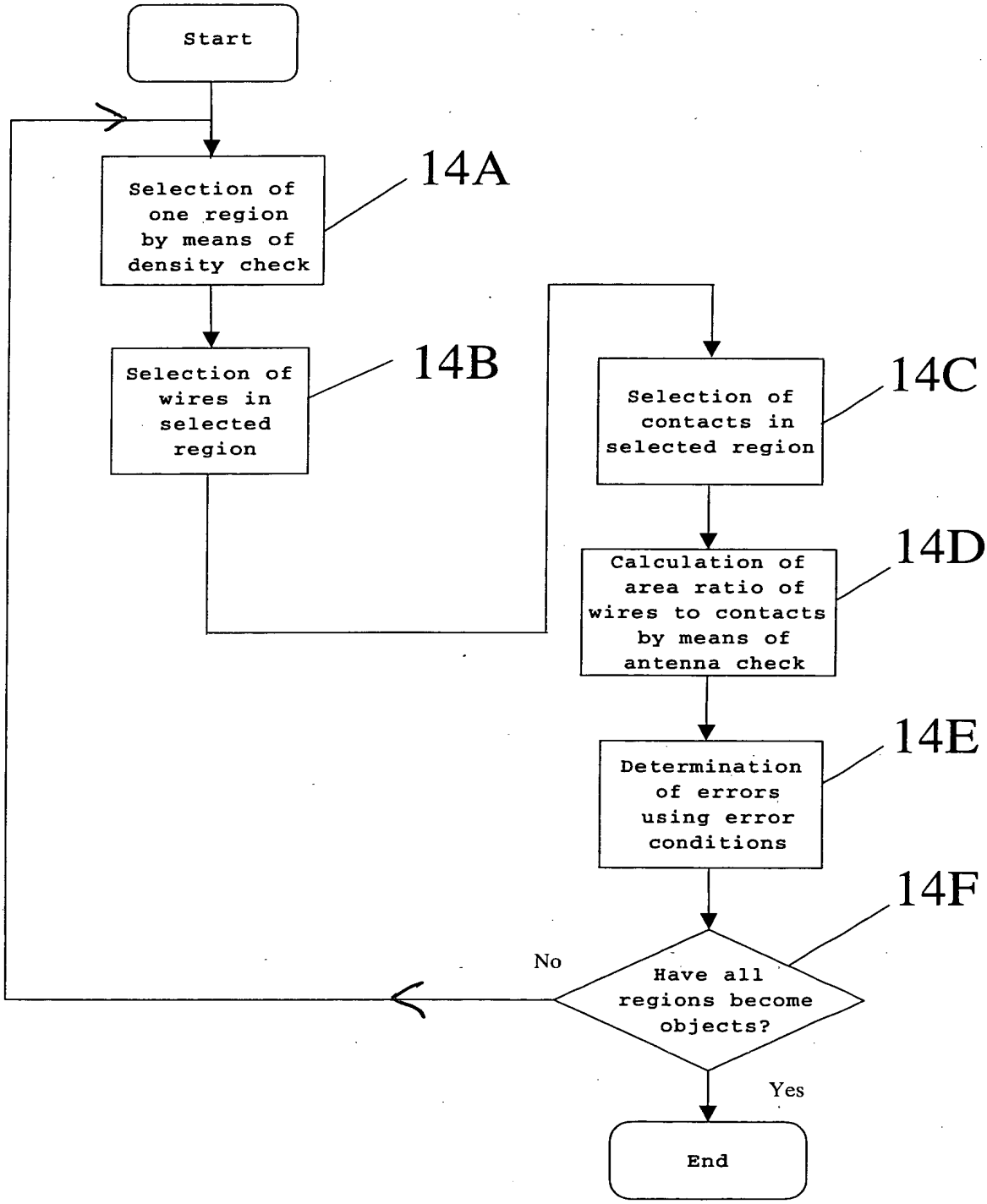

Layout data
Step of partial selection of Inspection regions
14a
Partial data of inspection regions
14c
Step of wire recognition
14b
Step of recognizing contacts
Wire data
Contact data
Step of area ratio calculation
14d
Error conditions
14e
Step of error determination

FIG. 45


Start
Selection of one region by means of density check
14A
Selection of wires in selected region
14B
Selection of contacts in selected region
14C
Calculation of area ratio of wires to contacts by means of antenna check
14D
Determination of errors using error conditions
14E
Have all regions become objects?
14F
No
Yes
End